

been recorded from the lower Amazon. The line of communication between the late Pliocene *Anisothyris* and the recent *Azara* was probably over the even now ill-defined divide between the upper Amazon and the La Plata. The close relationship between the fossil Mollusca of the head-waters of the Amazon and those now living in the lower La Plata is brought out much more emphatically by the fresh-water mussels of the Pebas fauna, which are now under investigation by William B. Marshall, Assistant Curator of the U. S. National Museum.

The loosely organized drainage of the Upper La Plata and the Upper Amazon seems a more plausible explanation of the existing faunal relationships than the later erection of a barrier between the Upper and Lower Amazon. In any case there is little trace of any recent lineage of the late Tertiary Pebas faunas in the lower waters of the Amazon.

BOTANY.—*Ruellia tuberosa and a few of its close relatives.*¹ EMERY C. LEONARD, National Museum. (Communicated by WILLIAM R. MAXON).

Every monographer, no doubt, is familiar with the fact that in most of his special groups there will be found a species more troublesome and puzzling than any of the others, a species with an extensive range, with numerous variations, and, when treated in monographs, often with a long list of synonyms. *Scutellaria angustifolia* Pursh of the skullcaps, *Passiflora foetida* L. of the passionflowers, and *Ruellia tuberosa* L. may be cited as examples. If they are treated as polymorphic species their descriptions will be too indefinite or elastic to be of much scientific value. If they are subdivided into a number of "species," based on slight or variable characters, the nomenclature will be cumbersome and the keys difficult to follow; furthermore, the types of the segregated species will have been chosen to represent extremes of variation, and there will remain a number of poorly defined intermediate examples.

In highly variable species of this sort an intermediate course is often practicable. If abundant material is available, it will usually be possible to select suitable characters on which to base a central type as a nucleus, around which may be grouped the closely related forms, mostly as varieties. Often on following such a plan it will be found that these will conform more or less to definite geographic areas. In

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the present work, a paper preliminary to a revision of the American Ruellias, the complex "species" *Ruellia tuberosa* L. is treated in accordance with this plan.

Ruellia, of the family Acanthaceae, is a large and variable genus, which has sometimes been subdivided into numerous genera. The plants vary from small herbs a few centimeters high to large bushy shrubs; the flowers may be inconspicuous or large and showy; the corollas tubular or broadly campanulate, and in color mauve, white, yellow, pink, or bright crimson; the indument extremely variable. Yet constant throughout all the species stand the four perfect didymous stamens, with the filaments of each pair united at the base and decurrent on the corolla tube, the oblong symmetric anthers, and the cylindric or clavate capsules.

It may be interesting to call attention to the type of seeds found in this genus. They are invariably flat and suborbicular. Though covered by a closely adhering pubescence, the surface, when dry, appears glabrous; if moistened, the flattened inconspicuous covering swells into a woolly gelatinous mass.

KEY TO THE SPECIES

Ovary and capsule glabrous.

Mature capsule slender, cylindric, 3 mm. broad; calyx ciliate or glabrate. 1. *R. tuberosa*.

Mature capsule stipitate, 4 to 5 mm. broad; calyx more or less glandular-puberulent. 2. *R. intermedia*.

Ovary and capsule puberulent.

Capsule eglandular or very sparingly glandular (North America).

3. *R. nudiflora*.

Capsule densely glandular-puberulent (South America) . . . 4. *R. lorentziana*.

1. *RUELLIA TUBEROSA* L. Sp. Pl. 634. 1753.

Ruellia clandestina L. Sp. Pl. 634. 1753.

Cryphiacanthus barbadensis Nees in DC. Prodr. 11: 197. 1847 (in part).

Roots clustered, thick-fibrous or fusiform; stems erect or ascending, usually branched, obscurely quadrangular, pilose or glabrate, bearing numerous minute cystoliths; petioles 0.5 cm. long, channeled, pilose or glabrate; leaf blades ovate or oblong, 2 to 11 cm. long, 1.5 to 6 cm. broad, obtuse at apex, abruptly narrowed toward base, undulate-erisped, rather thick, sparsely pilose or glabrous, the cystoliths numerous, 0.1 to 0.25 mm. long; flowers one to several, in erect or ascending dichotomous cymes, the peduncles up to 4 cm. long, glabrous or pilosulous, obscurely quadrangular, the cystoliths prominent; bracts linear, 3 to 8 mm. long; pedicels 5 to 10 mm. long, puberulent or glabrate; calyx 15 to 28 mm. long, the tube very short, the segments narrowly linear or subulate, ciliate or glabrous, often spreading; corolla showy, purple, 3 to 6 cm. long, sparsely puberulent, the tube about 1 cm. long, 3 mm. in diameter, the throat narrowly campanulate, 15 mm. in diameter at mouth, the limb 2 to 4 cm. broad, the lobes suborbicular, 12 to 15 mm. broad, undulate or erose; one filament of each pair of stamens 3 mm.

long, the other 8 mm., glabrous; anthers oblong, 4 mm. long, about 1 mm. broad, obtuse; style 20 mm. long, glabrous, the developed lobe of the stigma 2 mm. long, 1 mm. broad; capsule cylindric, 17 to 20 mm. long, 3 mm. broad, acute at apex, the callus puberulent, otherwise glabrous; retinacula curved, 1.25 mm. long, truncate at apex; seeds numerous (usually 20 or more in each capsule), lenticular, 2 to 2.5 mm. in diameter, appearing glabrous when dry, mucilaginous-pilose when moist.

TYPE LOCALITY: Jamaica.

Specimens examined:²

FLORIDA: Without locality, *Rugel* 742.

CUBA: Columbia, *Curtiss* 730. Nuevitas, Camaguey, *Shafer* 1129.

Without locality, *Wright* 1353.

JAMAICA: Port Antonio, on rocks of old Spanish fort, *Harshberger* 99. Hope Gardens, Kingston, dry ground, *Maxon* 1630. Between Kingston and Gregory Park, *Maxon & Killip* 302. Mouth of Great River, west of Montego Bay, *Maxon & Killip* 1432a.

HAITI: Miragoane, *Eyerdam* 31. Without locality, *Jaeger* 130. Port au Prince, *Leonard* 2765, 2785. Étroite, Gonave Island, open woods, *Leonard* 3372. Étang, Étang Saumatre, clearings, *Leonard* 3566.

DOMINICAN REPUBLIC: Haina, roadsides and open fields, *Faris* 183. Barahona, *Fuertes* 221.

Azua, *Rose, Fitch & Russell* 3692. San Pedro de Macoris, *Rose, Fitch & Russell* 4179. Without locality, *Wright, Parry & Brummel* 362.

PORTO RICO: Guayanilla, roadside, *Britton & Shafer* 1797. Fajardo, *Heller & Heller* 988. Yauco, *Heller* 6295. Ponce, *Prey* 8. Isabel Segunda, rocky hillsides, *Shafer* 2434. Salinas de Cabo Rojo, *Sintenis* 618. San Juan to Cangrejos, *Sintenis* 618b. Fajardo, *Sintenis* 1619. Guanica, *Sintenis* 3386. Guayama to Aguirre, brackish marsh, *Underwood & Griggs* 377.

ST. THOMAS: Raccoon Bay, *Britton, Britton & Shafer* 161.

ST. CROIX: Bassin Yard, *Ricksecker* 259.

ST. JAN: Lamosure, rocky hill, *Britton & Shafer* 617.

MONTSERRAT: Without locality, *Shafer* 502.

GUADELOUPE: Without locality, *Duss* 2366.

BARBADOS: Bathsheba, dry hillside, *Miller* 80. Without locality, *Botanic Station Herbarium* 74.

TRINIDAD: *Botanic Gardens Herbarium* 2914.

COLOMBIA: Estrella, Caño Papayal, Lands of Loba, Dept. Bolívar, common along roadsides, *Curran* in 1916. Cartagena, *Heriberto* 100. Dept. Atlántico, *Pennell* 12047. Santa Marta, *Smith* 746. Mariquita, Magdalena, *Triana* in 1852. Río Frío, Santa Marta, *Walker* 1205.

CURAÇAO: Sint. Jaris, *Curran & Haman* 237.

VENEZUELA: Ciudad Bolívar, *L. H. & E. Z. Bailey* 1621. Cristóbal Colón, *Broadway* 134. Río Chico, Miranda, *Jahn* 1245. El Vallé,

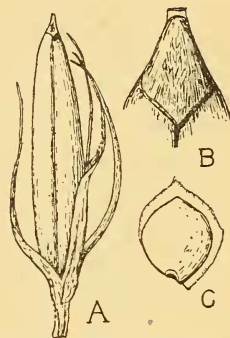


Fig. 1. *Ruellia tuberosa*. A. capsule, $\times 2$; B. tip of capsule, $\times 10$; C. seed, $\times 10$.

² All specimens cited are in the U. S. National Herbarium.

Miller & Johnston 88. Perijá, State of Zulia, *Tejera* 177. La Trinidad de Maracay, *Pittier* 5774. Between San José and Río Chico, State of Miranda, *Pittier* 6356. Hacienda El Volcán, near Santa Lucía, *Pittier* 8249. El Palito, near Puerto Cabello, in cactus formation, *Pittier* 9085. Valera and vicinity, Trujillo, *Pittier* 10786.

BRITISH GUIANA: Without locality, *Jenman* 4801. Peter's Hall and vicinity, Georgetown, weed in field, *Hitchcock* 16681. Georgetown, *Warren* in 1924.

The most striking characteristics differentiating the three allied species, *R. tuberosa*, *R. intermedia*, and *R. nudiflora* are found in the capsules. In *R. tuberosa* these are noticeably slender and cylindric, and, except for narrow cuneate puberulent calluses at the tip, are entirely glabrous, whereas the capsules of *R. nudiflora* are shorter, broader, more abruptly narrowed to the solid stipelike basal portion, and strongly puberulent; the hairs, at least on the lower portions, retrorse. The seeds of *R. tuberosa* are smaller and more numerous, and the flowers are broader and seem to be deeper lavender.

Between *R. tuberosa* and *R. intermedia* the difference is not so great. In habit and leaf characters the two species seem identical, but the capsules and seeds of *R. intermedia* agree in size and shape with those of *R. nudiflora*.

The geographical distribution of these three species is likewise highly significant. From the United States true *R. tuberosa* is represented in the National Herbarium by a single specimen collected in Florida. In Cuba, Hispaniola, Porto Rico, and Jamaica southward throughout the West Indies and northern South America it is rather common. On the other hand, *R. nudiflora* with its varieties is confined to Texas, southern New Mexico and Arizona, Mexico, and northern Central America.

Linnaeus described *R. tuberosa* as having "foliis ovatis crenatis, pedunculis unifloris." This would indicate that he had a one-flowered specimen, which is relatively rare in this species.

Nees's description of *Cryphiacanthus barbadensis* agrees with true *R. tuberosa*, but the range given includes the regions producing both *R. intermedia* and *R. nudiflora*, with varieties. Some of the varieties of *R. nudiflora* described in the present paper correspond to the varieties accompanying that description. Later writers, except Lindau, describe *R. tuberosa* as having puberulent capsules and the wide range here stated. The type locality of *C. barbadensis* and *R. clandestina* is Barbados, an island well within the range of true *R. tuberosa*.

As is frequently the case with plants of a showy or ornamental nature, a number of common names have been given to *R. tuberosa*. Some of these are "ipeca bâlard" or "petit ipica chandelier" (Guadeloupe), "many roots," "estilladora" (Porto Rico), "patale macaque" (Martinique), "salta perico" (Cuba), "minie root" (Barbados), "fleurs pétards" (Haiti).

2. *Ruellia intermedia* Leonard, sp. nov.

Roots thick-fibrous; stems 5 to 40 cm. high, erect or ascending, branched, quadrangular, puberulent, with additional spreading hairs about 1 mm. long; petioles 5 to 20 mm. long, channeled, puberulent, with a few longer

spreading hairs; leaf blades ovate to suborbicular, obtuse or rounded at apex, rounded or narrowed and decurrent at base, 2 to 7 cm. long, 1.5 to 4 cm. broad (those of the axillary shoots much smaller), thin, entire or undulate, both surfaces more or less puberulent, especially along the midrib and veins, sometimes with a few additional spreading hairs, the cystoliths prominent, up to 0.25 mm. long; flowers solitary or several in axillary dichotomous cymes, with a flower in the forks; peduncles up to 10 cm. long (usually not exceeding 4 cm.), puberulent; bracts lanceolate or oblanceolate, 3 to 15 mm. long, 1 to 3 mm. broad; pedicels stout, 3 to 8 mm. long, puberulent; calyx 10 to 22 mm. long, puberulent, the short hairs often mixed with longer spreading ones, usually glandular, the tube 1 to 2 mm. long, the segments linear, about 1 mm. broad at base, acute at tip, sometimes spreading at maturity; corolla 4 to 6 cm. long, purple, puberulent, the tube 2.5 mm. long, 2 to 3 mm. in diameter, the throat funnel-form, slightly oblique, 1 to 1.5 cm. broad at mouth, the limb 2 to 4 cm. broad, the lobes ovate, 10 to 15 mm. long, 10 to 14 mm. broad, undulate; one filament of each pair of stamens 6 mm. long, the other 12 mm., glabrous; anthers oblong, 3.5 mm. long, 1 to 1.5 mm. broad; ovary glabrous, with a tuft of hairs at the tip; style 3 to 3.5 cm. long, sparingly and minutely pilose, the developed lobe of the stigma 2.5 mm. long, 0.5 mm. broad; capsule 18 mm. long, 4 to 5 mm. broad, bluntly pointed at apex, gradually narrowed to a solid stipitate base about 2 mm. long, glabrous except for the pilose cuneate calluses near the tip, 10 to 12-seeded; retinacula truncate at apex; seeds lenticular, 2 to 2.5 mm. in diameter, mucilaginous-pilose when moist.

Type in the U. S. National Herbarium, no. 301,864, collected at Bolaños, Jalisco, Mexico, September, 1897, by J. N. Rose (no. 2915).

Additional specimens examined:

SINALOA: Imala, *Palmer* 1415. Las Palmas, *Ortega* 4516. Without locality, *Ortega* 4222. Hacienda Oso, Culiacán, *Partida* 2009. Rosario, *Rose* 1849. Mazatlán, thickets, *Rose, Standley & Russell* 14072.

COLIMA: Colima, *Palmer* 41.

MICHOACÁN or GUERRERO: Chutla, *Langlassé* 260.

MORELOS: Yautepec, *Rose, Painter & Rose* 8602.

GUERRERO: Iguala, altitude about 1,000 meters, *Rusby* 15.

This species is intermediate between *R. nudiflora* and *R. tuberosa*. It differs from the former in the shorter rounded leaves and glabrous capsules and from the latter in the puberulent stems and broader fewer-seeded capsules. The specimens cited vary somewhat in the proportion of glandular hairs and in the size of the flowers. *Rose, Standley & Russell* 14072 is a stunted plant, only a few centimeters high.

In Sinaloa the native name is given as "hierba del toro."

3. RUELLIA NUDIFLORA (Engelm. & Gray) Urban, Symb. Antill. 7: 382. 1912.

Dipteracanthus nudiflorus Engelm. & Gray, Bost. Journ. Nat. Hist. 5: 229. 1845.

Cryphiacanthus viscosus Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 128. 1854. Not *R. viscosa* H. B. K.

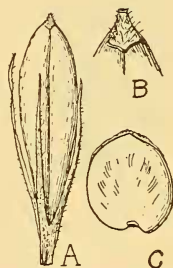


Fig. 2. *Ruellia intermedia*. A. capsule, $\times 2$; B. tip of capsule, $\times 10$; C. seed, $\times 10$.

Roots clustered, thick-fibrous; stems erect or ascending, 5 to 30 cm. high, usually branched, obscurely quadrangular, puberulent, with occasional longer spreading hairs, or glabrate; petioles 0.5 to 4 cm. long, both puberulent and pilose; leaf blades ovate or oblong, 2 to 12 cm. long, 1.5 to 7 cm. broad, obtuse at apex, narrowed or rarely rounded at base, decurrent, thickish, undulate-cripsed, sparingly puberulent or pilosulous, sometimes glabrate; inflorescence a terminal panicle of erect or ascending dichotomous cymes with

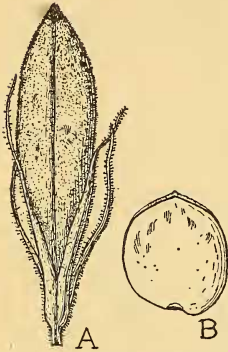


Fig. 3. *Ruellia nudiflora*.
A. capsule, $\times 2$; B. seed,
 $\times 10$.

a pediceled flower in each fork, or, when the peduncles are very short, an interrupted spike of verticillasters, or occasionally a single verticillastrate head; peduncles up to 5 cm. long but usually much shorter, puberulent, more or less glandular; bracts linear, 3 to 10 mm. long; pedicels 3 to 5 mm. long, glandular-puberulent; calyx 12 to 18 mm. long, glandular-puberulent, the tube very short, the segments linear or subulate; corolla purple, finely pubescent, 3 to 6 cm. long, the tube slender, 1 to 3 cm. long, 1 to 2 mm. in diameter, the throat funnelform or narrowly campanulate, 1 to 1.5 cm. broad at mouth, the limb 1.5 to 3.5 cm. broad, the lobes suborbicular, 10 to 15 mm. in diameter, erose; one filament of each pair of stamens 9 mm. long, the other 11 mm., glabrous; anthers 4.5 mm. long, about 1 mm. broad; ovary puberulent; style 3.5 cm. long sparsely pilosulous; the developed lobe of the stigma 2 mm. long, 0.5 mm. broad; capsule 15 mm. long, 4 mm. broad, pointed at tip, short-stipitate at base, puberulent, 8 to 16-seeded; retinacula curved, about

2 mm. long, truncate at apex; seeds lenticular, 3.5 mm. long, 3, mm. broad, mucilaginous-pilose when moist.

TYPE LOCALITY: Open woods at Sim's Bayou near Houston, Texas. Type collected by Lindheimer.

Specimens examined:

ARIZONA: Picture Rocks, Tucson Mts., *Bartram* 396. Santa Cruz Valley near Tucson, *Pringle* in 1881.

TEXAS: San Antonio, dry meadows, *Ball* 904; with white flowers, 905. Bryan, Brazos Co., low ground, *Biltmore Herbarium* 11080a. Travis Co., moist prairies, *Bodin* 214. Colombia, Brazoria Co., prairie, *Bush* 147, 313. Río Hondo, Cameron Co., *Chandler* 7053. Sequin, *Earle* 431. Houston, *Fisher* 92. San Antonio, white flowers, *Fisher* 103. La Porte, Harris Co., *Fisher* 628. Bracken, Comal Co., sandy soil, *Groth* 134. Hempstead, Walker Co., prairies, *Hall* 426. Houston, wet soil, *Hall* 427. San Antonio, *Havard* in 1881 (?). Corpus Christi, *Heller* 1417. Without locality, *Hildebrandt*. Burnet Co., *Hill* 18. Comanche Spring, Pecos Co., *Lindheimer* 1066. Bexar Co., *Jermy* 59. Without locality, wet places, *Mackenzie* 38. Santa Maria, Cameron Co., *Nealley* 170. Without locality, *Nealley* 86a, 301. Brownwood, Brown Co., rich prairies, flowers white, *Reverchon* 724. Blanco Co., flowers white, *Reverchon* 724. Corsicana, Navarro Co., *Reverchon* 3213. Dallas, low rich lands, *Reverchon* (*Curtiss* 1945). Río Cibolo, in mesquite woods, *Ridell* in 1839. Tarrant Co., dry woods along the Trinity River, *Ruth* 546. Bexar Co., *Schulz* 740. Austin, escape from cultivation, *Schulz* 743. San Antonio, *Slater* in 1918. Brownsville, Cameron Co., *Townsend* 28. Pierce, Wharton Co., *Tracy* 7642. Kingsville, *Tracy* 9183. Tom Green

- Co., *Tweedy* 2. Houston, *Ward* in 1877. El Paso, *Wright* 431. Spofford, Kinney Co., *Wooton* 126. Industry, Austin Co., *Wurzlöw* 33.
- TAMAULIPAS: San Fernando to Jiménez, *Nelson* 6605. Vicinity of Tampico, *Palmer* 436. Buena Vista, *Wooton* in 1919.
- NUEVO LEÓN: Monterrey, Bella Vista, *Arsène* 6184 (*Bro. Abbon* 6).
- COAHUILA: Sabinas, *Nelson* 6760. Saltillo, *Palmer* 159.
- SINALOA: Las Mochis, *Tays* in 1912.
- DURANGO: Durango, *Palmer* 650.
- OAXACA: Guatulco, *Liebmann* in 1842 (type coll. of *Cryphiacanthus viscosus* Oerst.).

The present species is usually distributed as *R. tuberosa*. It differs constantly from that in the narrower and more slender corolla and thicker and usually shorter puberulent capsules with fewer seeds.

The vernacular names "tremadora" and "violeta" have been given to this plant in Mexico. Tays states that in Sinaloa it is used as a cure for snake bites.

This species is extremely variable in habit, in size and shape of flowers and leaves, and in the nature of the pubescence. These variations are sufficiently constant to permit the maintenance of several varieties.

KEY TO *R. nudiflora* AND ITS VARIETIES

Leaves puberulent (often grayish).

Plants erect; at least a part of the inflorescence a naked terminal panicle; corolla 4 to 6 cm. long.

Leaf blades broadly ovate.....3a. var. *occidentalis*.

Leaf blades oblong.....3b. var. *grandiflora*.

Plants low, spreading or ascending; inflorescence of axillary cymes.
3c. var. *puberula*.

Leaves glabrous or pilosulous (usually sparsely so).

Plants low, seldom over 10 cm. high, few-flowered; stems strongly pilosulous.....3d. var. *humilis*.

Plants tall, usually over 20 cm. high; flowers several or numerous; stems puberulent, sparingly pilosulous, or glabrate.

Inflorescence verticillastrate; bractlets crowded; peduncles elongate. (The inflorescence of *R. nudiflora* and of the varieties *ovata* and *occidentalis* is often more or less verticillastrate, but when so, the pedicels are very short.).....3e. var. *congesta*.

Inflorescence of peduncled dichotomous cymes, some, at least, of these forming a naked terminal panicle.

Leaves mainly basal; plants usually less than 30 cm. tall; inflorescences beginning at the base of the plant.....3f. var. *yucatanica*.

Leaves distributed on the stems; plants usually over 30 cm. tall; inflorescence more or less terminal.

Leaves prevailingly large, at least some of them over 5 cm. broad; inflorescences densely glandular-pilosulous....3g. var. *glabrata*.

Leaves smaller, seldom over 4 cm. broad; inflorescences glandular-puberulent.

Corolla 2 to 3 cm. long, the tube 7 to 10 mm. long, the panicle large, open (plants of West Indies).....3h. var. *insularis*.

Corolla 3 to 6 cm. long, the tube usually over 10 mm. long; panicles usually narrow (mainland plants).....3. *R. nudiflora*.

3a. *Ruellia nudiflora occidentalis* (A. Gray) Leonard.

Ruellia tuberosa occidentalis A. Gray, Syn. Fl. 2: 325. 1878 (in part).

Plants larger than in the species, up to 60 cm. high; stems erect or ascending, branched, glandular-pubescent; petioles slender, 1 to 4.5 cm. long, glandular-pubescent; leaf blades ovate, 4 to 18 cm. long, 2.5 to 8 cm. broad, obtuse or rounded at apex, rounded or subcordate and decurrent at base, undulate or crenate, grayish-puberulent, more or less glandular; inflorescence a large terminal panicle, or an interrupted spike of verticillasters, the branches glandular-puberulent, the bracts linear, 5 to 10 mm. long, glandular-puberulent; peduncles up to 3 mm. long; calyx 1.5 to 2.5 cm. long, densely glandular-pilosulous, the segments linear-subulate; corolla purple, 4 to 5 cm. long, the tube 2 to 3 cm. long, 2 mm. in diameter, the throat funnelform, 15 mm. broad at mouth, the limb 2 to 3 cm. broad; one filament of each pair of stamens 10 mm. long, the other 14 mm.; anthers 3 mm. long, 1 mm. broad; style 4 cm. long; developed lobe of the stigma 2 mm. long, scarcely broader than the style; capsule 15 to 17 mm. long, puberulent, some of the hairs glandular.

TYPE LOCALITY: Texas. Type collected by Berlandier.

Specimens examined:

"NEW MEXICO": Without locality, *Wright* 1455.

TEXAS: Sabinal Canyon, shaded rocks, *Revershon* 1579. Atascosa Co., sandy soil, *Schulz* 489c. El Paso, *Wright* 430.

NUevo LEÓN: Monterrey, Guadalupe, alt. 540 meters, *Arsène* 6143 (*Abbon* 25). Monterrey, along an irrigation ditch, *Dodge* 75.

VERACRUZ: Río de Santa María, Zacualpan, rocky open woods, *Purpus* 1940, 2264. Barranca de la Ternera, *Purpus* 8205.

OAXACA: Cuicatlán, *Conzatti* 3989.

This variety is based on the large cordate ovate leaves, large viscid panicles, and slender corollas.

3b. *Ruellia nudiflora grandiflora* Leonard, var. nov.

Stem erect or ascending, puberulent with interspersed longer spreading hairs, more or less glandular above; petioles up to 1 cm. long, puberulent with minute curved hairs and sparsely pilose; leaf blades oblong, 3 to 6 cm. long, 1 to 2.5 cm. broad, strongly crenate-cripsed to subentire, obtuse or acutish at apex, narrowed and decurrent at base, puberulent and pilosulous; flowers in 3's, subsessile on short ascending peduncles (up to 3 cm. long), or verticillate; calyx 15 to 22 mm. long, pilosulous, more or less glandular, the segments subulate, 1 mm. broad at base; corolla 6 cm. long, the tube slender, 2 to 3 cm. long, 2.5 to 3 mm. in diameter, the throat funnelform, 15 mm. broad at mouth, the limb 3 to 4 cm. broad, the lobes 15 to 17 mm. broad, undulate; one filament of each pair of stamens 12 mm. long, the other 15 mm.; anthers 4.5 mm. long, 1.5 mm. broad; ovary puberulent; style 4 to 5 cm. long; mature capsule not seen.

Type in the U. S. National Herbarium, no. 452,096, collected near Yautepec, Morelos, Mexico, July, 1905, by J. N. Rose, J. H. Painter, and J. S. Rose (no. 8601).

Additional specimen examined:

DURANGO: Ramos to Inde, *Nelson* 4691.

Nelson 4691 from Durango, is apparently eglandular, but in all other respects it agrees with the type.

3c. *Ruellia nudiflora puberula* Leonard, var. nov.

Low spreading plants 10 to 20 cm. high; stems ascending, branched, puberulent, the minute hairs mixed with longer spreading ones, the younger stems rather densely pilose; petioles about 1 cm. long; leaf blades oblong-elliptic, 2 to 10 cm. long, 1 to 3 cm. broad, obtuse or rounded at apex, gradually narrowed and decurrent at base, firm, undulate-crisped, gray-puberulent with minute curved hairs interspersed with longer spreading ones; inflorescence of axillary dichotomous cymes with a flower in the forks; peduncles 1 to 9 cm. long, glandular-pubescent; bracts leaf-like, 5 to 10 mm. long, 2 to 3 mm. broad, occasionally much larger; pedicels 5 to 10 mm. long or the one in the lowest fork becoming stout, and 15 to 20 mm. long; calyx 15 to 30 mm. long, grayish-puberulent and ciliate, the segments linear, keeled, 1 mm. broad at base; corolla 3 to 4 cm. long, the tube 10 to 12 mm. long, 1.5 mm. in diameter, abruptly enlarged into the broadly funnelform or narrow campanulate throat, this 15 mm. broad at mouth, the limb 3 to 3.5 cm. broad, the lobes rounded, undulate, often emarginate; one filament of each pair of stamens 5 mm. long, the other 9 mm.; anthers 3.5 mm. long, 1 mm. broad; style 2 to 2.5 mm. long, the developed lobe of the stigma 2 mm. long, 0.5 mm. broad; capsule 15 to 18 mm. long, 4 mm. broad.

Type in the U. S. National Herbarium, no. 579,619, collected in pasture near Gualan, Guatemala, June 17, 1909, by Charles C. Deam (no. 6318).

Additional specimens examined:

OAXACA: Tlacolula, alt. 1,600 meters, *Conzatti* 1454. Lagunas, alt. 250 meters, *Nelson* 2652. Tehuantepec, *Orcutt* 3322.

GUATEMALA: Gualan, in pasture, flowers nearly white, *Deam* 6332. Fiscal, barren hilltop, *Deam* 6227.

SALVADOR: Río del Molino, Dept. Santa Ana, *Calderón* 2184. Laguna de Olomega Dept. San Miguel, alt. 75 meters, *Standley* 21051.

This variety differs from the species in its grayish, sparingly glandular pubescence, axillary inflorescences, and smaller flowers. The leaves are broader and more rounded at the apex.

3d. *Ruellia nudiflora humilis* (Nees) Leonard.

Cryphiacanthus barbadensis humilis Nees in DC. Prodr. 11: 198. 1847.

Low plants, 5 to 15 cm. high; stems white-pilose, glandular-puberulent above; petioles about 1 cm. long, white-pilose; flowers 2 or 3, in dichotomous cymes, the peduncles densely glandular-puberulent; pedicels 2 to 5 mm. long; calyx 10 to 15 mm. long, the lobes subulate; corolla 3 to 4 cm. long, the tube about 12 mm. long, the throat funnelform, 10 to 12 mm. broad at mouth, the limb 2 to 2.5 cm. broad, the lobes rounded, emarginate; one filament of each pair of stamens 5 mm. long, the other 8 mm.; anthers 2.5 mm. long, 1 mm. broad; style about 2 cm. long, the developed lobe of the stigma 2 mm. long, 0.5 mm. broad; capsule 12 to 13 mm. long, 4 mm. broad.

TYPE LOCALITY: Cuba.

Specimens examined:

TEXAS: Bexar Co., *Jermy* 146. Fort Clark, Kinney Co., *Mearns* 1440.

This variety is distinguished by the short stems, small ovate pilose leaves, and short few-flowered cymes.

3e. *Ruellia nudiflora congesta* Leonard, var. nov.

Low plants; stem erect, 15 to 20 cm. high, branched, puberulent, the nodes pilose, glandular above; petioles 5 to 10 mm. long; leaf blades oblong, 4 to 8 cm. long, 1 to 3 cm. broad, rounded at apex, narrowed and decurrent at base, sparingly pilose, or the veins on the lower surface sparsely puberulent; inflorescence verticillastrate, the flowers in 3's, on peduncles 1 to 2 mm. long; bractlets lanceolate, 3 to 5 mm. long, 1 to 1.5 mm. broad, glandular-pilosulous, crowded at base of pedicels; pedicels 1 to 2.5 cm. long, glandular-pilosulous; calyx 12 to 13 mm. long, the tube 1 mm. long, the segments subulate, keeled, densely glandular-pilose; flowers not seen; capsules about 1 mm. long.

Type in the U. S. National Herbarium, no. 938,568, collected in San Luis Potosí, Mexico, in 1877 by J. G. Schaffner (no. 398).

The verticillastrate inflorescence with crowded bracts and elongate pedicels is peculiar to this variety. In shape and arrangement of leaves it resembles the variety *yucatana*.

3f. *Ruellia nudiflora yucatana* Leonard, var. nov.

Roots thick-fibrous or fusiform; stem 5 to 30 cm. high, usually branched, puberulent, the hairs short and curved, interspersed with longer spreading ones, glandular above; leaves mostly basal; petioles slender, up to 3 cm. long; leaf blades oblong-elliptic or spatulate, 4 to 12 cm. long, 1 to 4 cm. broad, rounded at apex, gradually narrowed and decurrent at base, pilosulose or glabrate, the cystoliths prominent; inflorescences peduncled, glandular-puberulent, dichotomous cymes produced by the entire plant, the lower axillary, the upper forming a naked terminal panicle, the flowers in 3's, crowded at the tips of the branches; bracts linear, 5 mm. long; peduncles 1 to 3 mm. long, or that of the lowest flower occasionally reaching 15 mm.; calyx 5 to 14 mm. long, glandular-puberulent, the segments subulate, the tips usually curved or twisted; corolla 2.5 to 3 cm. long, the tube 6 mm. long, the throat funnelform, 1 cm. broad at mouth, the limb 2.5 cm. broad, the lobes rounded, about 1 cm. broad; one filament of each pair of stamens 4 mm. long, the other 6 mm.; anthers 2.5 mm. long, 1 mm. broad; capsule 12 mm. long.

Type in the U. S. National Herbarium, no. 268,387, collected in open grounds near Izamal, Yucatán, in 1895, by G. F. Gaumer (no. 759).

Additional specimens examined:

YUCATÁN: Izamal, in open grounds, *Gaumer* 488. Chichankanab, *Gaumer* 1801. Without locality, *Gaumer* 24218. Mérida, waste ground, *Valdez* 23.

The small crowded flowers, the curved calyx segments, the spatulate basal leaves, and the presence of basal cymes characterize this variety.

3g. *Ruellia nudiflora glabrata* Leonard, var. nov.

Ruellia tuberosa occidentalis A. Gray, Syn. Fl. 2¹: 325. 1878 (in part).

Large plants; stem erect, branched, glabrous, sparsely pilose below, glandular-puberulent above, the cystoliths prominent; petioles 1 to 3 cm. long, glabrous or sparingly pilose; leaf blades ovate to oblong-ovate, 6 to 18 cm. long, 3 to 10 cm. broad, rounded or obtuse at apex, rounded, then narrowed and decurrent at base (narrowed basal portion relatively broader than in the variety *occidentalis*), undulate or crisped, glabrous or the veins sparingly pilose, the cystoliths prominent; inflorescence a terminal open panicle of dichotomous cymes with a flower in the forks, or, when the peduncles are very short, an interrupted spike of verticillasters, the branches of the inflorescence, the pedicels, and calyces glandular-pubescent; corolla purple, 2.5

to 4 cm. long, the tube 1 cm. long, 2 mm. in diameter, the throat funnel form, 1.5 cm. broad at mouth, the lobes rounded, 10 to 15 mm. broad, undulate or entire, the limb 2 to 3 cm. broad; one filament of each pair of stamens 6 mm. long the other 12 mm.; anthers 3.5 to 4 mm. long, 1 mm. broad; style about 2 cm. long, sparingly puberulent, the developed lobe of the stigma 2 mm. long 0.5 mm. broad; capsule 15 mm. long, 3 to 6 mm. broad.

Type in the U. S. National Herbarium, no. 44,091, collected at Ciénaga, New Mexico, Aug. 1874, by J. T. Rothrock (no. 560).

Additional specimens examined:

ARIZONA: San Bernardino Ranch, *Mearns* 737, 1999. Tumamoc Hill, Tucson, *Harris* C16551. Tucson, *Smart* in 1867; *Thornber* 55.

TAMAULIPAS: Tampico, alt. 15 meters, *Palmer* 172.

SONORA: La Ciénaga, under mesquite, *Goodding* 959. Guaymas, *Palmer* 98.

SINALOA: Topolobampo, *Palmer* 194. Fuerte, along a hedge near town, *Rose, Standley & Russell* 13563.

COLIMA: Without locality, *Palmer* 1287.

OAXACA: Cuicatlán, *Nelson* 1664.

TABASCO: Without locality, *Rovirosa* 530.

GUATEMALA: Gualan, low place in pasture, *Deam* 6317.

Ruellia tuberosa occidentalis A. Gray, described as a plant with "leaves from glabrate to velvety-pubescent," includes both *R. nudiflora occidentalis* (Gray) Leonard and *R. nudiflora glabrata* Leonard. As all the specimens cited belong strictly either to the glabrous type or to the velvety-pubescent type, with no intermediates, this character was chosen as a basis for separation, the name *occidentalis* being assigned to the latter.

3h. *Ruellia nudiflora insularis* Leonard, var. nov.

Ruellia nudiflora Urban, Symb. Antill. 7: 382. 1912, in part, as to specimens cited; not *Dipteracanthus nudiflorus* Engelm. & Gray.

Suffrutescent; stem up to 40 cm. high, branched, erect or ascending, glabrous or sparingly pilose, minutely glandular-puberulent above; petioles slender 1 to 1.5 cm. long; leaf blades ovate, 2 to 7 cm. long, 1.5 to 4 cm. broad, rounded at apex, abruptly narrowed and decurrent at base, undulate or crenate-crisped, glabrous of the veins of the lower surface sparingly-pilose, the cystoliths conspicuous; inflorescences dichotomous cymes with a flower in the forks, the lower axillary, the upper forming a large naked open panicle; peduncles, pedicels, and calyces minutely glandular-puberulent; bracts lance-linear; pedicels up to 1 cm. long; calyx 15 mm. long, the segments subulate, 1 mm. broad at base; corolla bright purple, 3 cm. long, the tube 1 cm. long, 2 mm. in diameter, the throat funnelform, about 12 mm. broad at mouth, the limb 2.5 cm. broad, the lobes suborbicular, about 1 cm. broad, shallowly emarginate; one filament of each pair of stamens 5 mm. long, the other 7 mm.; anthers 4 mm. long, 1 mm. broad; ovary puberulent; style about 2 cm. long; capsule 16 to 18 mm. long, 4 mm. broad, puberulent.

Type in the U. S. National Herbarium, no. 944,027, collected at Las Pailas, Cuba, May, 1889, by Eggers (no. 5452).

Additional specimens examined:

HAITI: Fond Parisien, shore of Étang Saumatre, along irrigation ditch, *Leonard* 4158.

DOMINICAN REPUBLIC: Guayubín, Provincia de Monte Cristi, alt. 100 meters, *Abbott* 986. Barahona, *Fuertes* 804.

Except for its shorter puberulent capsules and smaller flowers this variety bears a close resemblance to *R. tuberosa* L.

4. *RUELLIA LORENTZIANA* Griseb. Abh. Ges. Wiss. Goetting. 24: 259. 1879.

Suffrutescent; stem erect, obscurely quadrangular, glandular-puberulent, the cystoliths prominent, about 0.25 mm. long; petioles 1 to 3 cm. long, glabrous or sparsely pilose, the cystoliths numerous; leaf blades ovate, up to 10 cm. long, 5.5 cm. broad, obtuse at apex, abruptly narrowed and decurrent at base, rather firm, crenulate-cripsed, both surfaces glabrous or bearing a few scattered hairs about 1 mm. long, the cystoliths numerous and prominent; inflorescence a terminal interrupted narrow panicle, the branches 2 or 3-flowered; peduncles 1 to 5 cm. long, glandular-puberulent; bracts linear, 3- to 8 mm. long, glandular-puberulent, pedicels 1 to 2 mm. long, glandular-puberulent; calyx 10 to 12 mm. long, glandular-puberulent, the tube 2 mm. long, the segments linear-subulate, unequal, 0.5 mm. broad at base; flowers not seen, the corolla described as "glabra; tubo e basi angusta supra calycem curve dilatato lobis late rotundatis duplo longiori, antheris inclusis cordato-oblongis;" capsule 2 cm. long, 4 mm. broad, fusiform, abruptly narrowed and pointed at apex, narrowed at base, the solid portion about 4 mm. long, 1 mm. broad at lowest point, 2 mm. broad at beginning of cavity 12 to 16-seeded, glandular-puberulent; retinacula tridentate at apex; seed flat, ovate, subcordate at base, about 3 mm. long and 2 mm. broad, mucilaginous-pilose when moist.

TYPE LOCALITY: Tucumán, Argentina.

Specimen examined: Argentina, Formosa, *Jorgensen* 2845.

This species is closest to *R. nudiflora glabrata* but can be distinguished by its narrow panicle of crowded flowers, densely glandular stems, inflorescence, and capsules, smaller keeled calyx segments and glabrous (?) corolla.

BOTANY.—*New plants from Central America.*—X.¹ PAUL C. STANDLEY, U. S. National Museum.

Most of the plants described below belong to the genus *Ardisia*, of the family Myrsinaceae, a group of shrubs or small trees with edible fruits and handsome, though small, flowers. The genus is abundantly represented in the mountains of Central America.

There is included also the description of a species of *Elaphrium* obtained many years ago in Nicaragua by the pioneer Central American collector, Oersted. Although somewhat out of place here, I have inserted the diagnoses of two strikingly distinct Mexican plants procured by Dr. Blas P. Reko, who has contributed to the National Herbarium material of so many rare Mexican species.

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